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 <https://doi.org/10.55463/issn.1674-2974.50.4.10>

Efforts to Prevent Occupational Accidents and Diseases in Archipelago Dryland Rice Field Farmers, Central Sumba Regency

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Received: February 17, 2023 ▪ Revised: March 19, 2023 ▪ Accepted: March 24, 2023 ▪ Published: April 28, 2023

Abstract: All fields of work have potential hazards ranging between mild, moderate, and severe. Moreover, the number of deaths due to accidents and occupational diseases increases from year to year. Therefore, occupational safety and health (OHS) must be applied to all areas of life, formal and informal workers. A quasi-experimental method with random cluster sampling selected 50 rice farmers from Umbu Pabal Village, West Umbu Ratunggai Subdistrict, Central Sumba District, divided into two groups. Most (100%) of the respondents had never been trained in OSH and the use of chemicals (pesticides). After the treatment, there was a very significant reduction in the number of work accidents. This has a further impact on increasing the work productivity of rice farmers who receive the intervention (OHS training and use of PPE) higher than farmer groups who do not receive an intervention. The application of OHS to rice farmers can reduce the number of work accidents and occupational diseases, which directly impact the increase in the work productivity of rice farmers. OHS training and controlling the adverse impact of the work environment by using PPE is an obligation for all rice farmers to avoid the danger of work accidents.

Keywords: work accidents, occupational diseases, dryland farmers.

中松巴摄政群岛旱地稻田农民预防职业事故和疾病的努力

摘要：所有工作领域都存在轻微、中度和严重之间的潜在危害。此外，因事故和职业病死亡的人数逐年增加。因此，职业安全与健康(职业健康安全)必须适用于生活的所有领域，包括正式和非正式员工。采用随机整群抽样的准实验方法从中松巴区西翁布拉通盖街道的翁布帕巴尔村抽取了 50 名稻农，分为两组。大多数(100%)受访者从未接受过职业安全与卫生和化学品(农药)使用方面的培训。治疗后，工作事故的数量明显减少。与未接受干预的农民群体相比，这对提高接受干预(职业健康安全培训和使用个人防护装备)的稻农的工作效率有进一步的影响。将职业健康安全应用于稻农可以减少工伤事故和职业病的发生，直接影响稻农劳动生产率的提高。职业健康安全培训和使用个人防护装备控制工作环境的不利影响是所有稻农避免工作事故危险的义务。

关键词：工伤事故、职业病、旱地农民。

1. Introduction

Every job has a risk of injury; the amount varies from job to job, geographical area, and gender. Low-income countries (LMICs) experienced an increase in the number of work accidents but decreased in high-income countries (HICs) even in the current era of globalization.

Workers have a risk of health problems caused by the work process, work environment, and health behavior of workers. Workers are at risk of having not only communicable and non-communicable diseases but also work-related diseases, including diseases due to work relations. According to the International Labor Organization (ILO), occupational accidents and diseases cause more than 2.3 million deaths per year, of which work accidents cause more than 350,000 deaths, and almost 2 million are caused by occupational diseases [2]. In Indonesia, the number of work accidents shows an increasing trend. In 2017, the number of work accidents reported was 123,041; meanwhile, throughout 2018, it reached 173,105. Data from the Employment Social Security Administration (BPJS) explained that until October 2020, there were 129,305 work accidents in Indonesia, including 4,275 cases of disability, 9 cases of total permanent disability, and 2002 cases of death [3].

Formal and informal workers, including rice farmers, have not been properly protected from accidents and occupational diseases, especially the absence of special OHS education and training [1]. Buranatrevedh and Sweatsriskul (2005) in [1] stated three main problems in occupational safety and health for farmers in Thailand: symptoms of disease due to contact with pesticides (65%), musculoskeletal problems (16.6%-75.9%), and injuries (1.1%-83.2%) during the farming process. In [4], per one million workers per year in India, 589 agricultural workers were found to have work accidents.

[4] stated that in India, there were 3.6 times more work accidents experienced by male workers than those experienced by female workers. Following the results of research on island dryland rice farmers in Umbu Pabal Village, Central Sumba Regency [1], the root causes are the use of traditional equipment in various agricultural activities, low OHS knowledge, and unskilled and disciplined farmers in performing their work. Therefore, every ergonomic intervention in designing tools and equipment, OHS training, and use of personal protective equipment have a significant impact in reducing the number of accidents and occupational diseases.

The results of identifying work accident problems in Central Sumba Regency [1] indicate that all stages of

farming can cause accidents and occupational diseases; the frequency of accidents includes injuries, falls, thorns, and chemical poisoning. Rice farmers do not have occupational health and safety work procedures in farming, especially when using tractors to plow the fields, but work based on experience transmitted from person to person. In addition, farmers do not use personal protective equipment such as mud shoes, gloves, and masks when using chemicals and pesticides. This study seeks to find a model for implementing OHS among dryland rice farmers, especially on Sumba Island.

2. Research Methodology

Two groups of 50 people were selected as the target group. The quasi-experimental method was used to observe the differences between the two farmer groups [1]. The variables of occupational health and safety training and use of PPE were tested in the treatment group to assess the effect of each variable on the incidence of accidents or injuries, complaints of illness or work-related illness, and work productivity of dryland rice farmers in the archipelago. The Wilcoxon test was used to assess the significance of the differences between the variables applying OSH before and after being applied to the treatment group. The Mann-Whitney test was used to assess the significance of the differences in the OSH application variables between the treatment and control groups.

The data were collected using a list of questions and special observation guidelines for the occupational safety and health of rice farmers [1] and then tabulated and analyzed descriptively and analytically using a computer application.

3. Results and Discussion

The area of Central Sumba Regency is hilly, where most of the area (43.84%) is at an altitude of 300 m above sea level. As for the aspect of land slope, 33% of the Central Sumba Regency is flat, 21% of the area is sloping, and the rest is steep to rather steep [5]. Based on data from the NTT BPS in 2019 figures, the total agricultural land in this region is 186918 ha. The area of rice fields is 7601 Ha and currently, with the central government program with various assistance, including the distribution of tractors, there is an increase in the area of rice fields to 8600 Ha [6]. With the potential for rice fields and intensification of processing using modern technology, it may have an impact on increasing the potential for accidents and occupational diseases. If farmers and their families are not provided with adequate education about OHS, they are vulnerable to accidents and hazardous chemical

poisoning.

3.1. Results

Table 1 shows that the demographics of rice farmers are dominated by male workers (0.84), the age of most farmers is between 48 and 69 (0.64), and more than

0.72 work full-time. This shows that majority of the treatment and control groups are rice farmers and do not have other jobs. Those who work part-time have other jobs such as cattle herding, gardening, and selling agricultural products in traditional markets.

Table 1 Characteristics and occupational accidents of rice farmers in the control and treatment groups

No.	Characteristics and Types of Work Accidents	Control		Treatment	
		N of the respondents	% of the respondents	N of the respondents	% of the respondents
1	Sex				
	a. Male	21	84	20	80
	b. Female	4	16	5	20
	Total	25	100	25	100
2	Age (Year)				
	a. 26-36	4	16	4	16
	b. 37-47	3	12	5	20
	c. 48-58	9	36	4	16
	d. 59-69	7	28	7	28
	e. 70-80	2	8	5	20
	Total	25	100	25	100
3	Working time				
	a. Full time	18	72	19	76
	b. Part time	7	28	6	24
	Total	25	100	25	100

Occupational health data from observations before and after the OHS program interventions are presented

in the following table.

Table 2 Types of occupational diseases (OD) of rice farmers in the treatment and control groups (Analysis results [1])

Occupational disease type	Respondents			
	Before		After	
	Treatment	Control	Treatment	Control
Itching (water fleas and/or insect bites)	27	13	0	12
Low back pain (LBP)	8	7	3	8
Dizzy from the hot sun	5	15	0	15
tired body	5	7	1	1
Coughs due to tractor exhaust	3	2	1	1
Pesticide poisoning	2	0	0	0
Stomach ache	1	2	0	0

Data in Table 2 reveal that the number of pain complaints among farmers (occupational diseases) after the training in OHS and use of PPE reduced significantly. This shows the importance and value of OHS education to increase the knowledge and insight of dryland rice farmers for safe and safe work.

3.2. Discussion

The results of the Mann–Whitney test analysis revealed that there was a significant difference in the level of the two-tailed test before and after the intervention between the treatment and control groups. OSH education and training (p-value $0.00 < 0.05$), use of PPE (p-value $0.00 < 0.05$), work accidents (p-value $0.00 < 0.05$), occupational diseases (p-value $0.00 < 0.05$), and work productivity of rice farmers (p-value $0.00 < 0.05$). This can be interpreted that the intervention can increase the understanding and awareness of rice farmers in the treatment group of the importance of OHS in their activities to reduce the

number of accidents and occupational diseases (OD) and increase their work productivity.

The results of the Wilcoxon signed-rank test showed that education and training in OHS (p-value $0.00 < 0.05$), work accidents (p-value $0.00 < 0.05$), OD (p-value $0.00 < 0.05$), and work productivity (p-value $0.00 < 0.05$) differed significantly before and after the intervention in the sense that accidents and OD experienced by farmers in the treatment group were significantly different before and after implementing OHS in the agricultural sector. Likewise, the work productivity of rice farmers was significantly different before and after the intervention. This shows that the implementation of the OHS program is effective in reducing the number of accidents and OD and increasing work productivity, especially for dryland rice farmers in the archipelago.

[7] emphasized that managing risk in an integrated manner with organizational reform that implements OHS is an essential requirement in the era of modern

technology with increasingly free and open competition. The protection referred to includes aspects, especially mechanical technology, the use of hazardous and toxic chemicals for life that is economically beneficial to humans but detrimental to other living things and the environment [8, 9]. Therefore, agricultural workers (rice farmers) continuously gain knowledge about safe and secure farming methods. Hazards with high risk can practically be reduced to the lowest possible level when control measures are implemented, reducing injuries or illnesses in the workplace [10]. [7] asserted that OHS training provides the workforce with the skills and abilities needed to perform their duties properly. It informs paddy farmers about risks in the workplace and procedures to prevent or minimize risks. In general, the above aims to change attitudes so that the group leader and his members are actively involved in applying the OHS method and are an essential part of their work in the fields. OHS training regularly allows farmers' knowledge about healthy and safe work to be updated.

This follows the opinion of [11], who recommend OHS training interventions for rice farmers that can reduce the dangers of exposure to pesticides and related chemicals. [12] emphasized that OHS education and training had a positive impact on farmers' perceptions of prevention efforts to reduce the number of vulnerabilities to accident risk factors and OD.

[13] and [14] confirmed that early intervention in implementing efforts to prevent occupational and environmental hazards, including the use of pesticides, had a positive impact on increasing farmers' knowledge and understanding of OHS. In addition, [15] found a significant relationship between the level of knowledge, how to store pesticides, where to mix pesticides, and how to handle pesticides after spraying with the incidence of pesticide poisoning in horticultural farmers' wives.

According to [4], AIR for male workers is 3.6 times higher than that for female workers. The root cause of accidents is the use of traditional equipment in various agricultural activities. Therefore, ergonomic intervention in the redesign of agricultural tools and equipment, safety, and health training will significantly improve the health and safety of workers [16].

4. Conclusion

The total incidence of occupational accidents and occupational diseases in the rice farmer group who received OSH training and used personal protective equipment was significantly different from the rice farmer group who did not receive a similar program. The more the implementation of OHS training programs, the lower the exposure to accidents and occupational diseases.

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